

STOWABLE SEAT ASSEMBLY
(115847.00002)

RELATED APPLICATION

This application claims priority benefit of U.S. provisional patent application No. 60/431,541 filed on December 6, 2002.

FIELD OF THE INVENTION

This invention relates to a stowable seat assembly and more particularly, to a stowable seat assembly suitable for use on mass transportation vehicles.

BACKGROUND OF THE INVENTION

Seats used in mass transportation vehicles sometimes need to be movable to a position which increases available floor space and allows insertion of other items, such as a wheelchair. Known stowable seat assemblies typically fall into several categories including: transverse flip seats, longitudinal flip seats and "ironing board" seats. With transverse and longitudinal flip seats the seat is fixed to the vehicle and a seat base can be pivoted up against a seat back. This allows for some increase in the amount of floor space. With ironing board seats, the seat back folds down and the seat base and seat back together fold up against the wall. Although such designs increase available floor space, they are disadvantageous in that the seat backs are not as strong as they could be since they are foldable. That is, the

1 strength of the seat back depends solely on the pivot and locking mechanism.
2 Further, ironboard seats stand out from a vehicle wall a substantial distance when
3 folded, consuming valuable floor space and partially obscuring and hindering the
4 view of passengers seated in the vehicle. It would be desirable to provide a
5 stowable seat assembly which increases floor space while maintaining seat strength
6 and avoiding problems associated with obscured and hindered views.

7 8 SUMMARY OF THE INVENTION

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10 In accordance with a first aspect, a stowable seat assembly for a vehicle
11 comprises a seat having a seat back and a seat base pivotable with respect to the
12 seat back and a support which supports the seat and connects the seat to a wall or
13 a floor of the vehicle. The seat is movable between a normal position, a first stowed
14 position or a second stowed position. The seat moves forward with respect to the
15 vehicle to move the seat from the normal position to the first stowed position and the
16 seat pivots about ninety degrees with respect to the vehicle to move the seat to the
17 second stowed position. The support can comprise a frame and a link which allow
18 relative movement between one another during movement of the stowable seat
19 assembly.

20
21 From the foregoing disclosure and the following more detailed description of
22 various preferred embodiments it will be apparent to those skilled in the art that the
23 present invention provides a significant advance in the technology and art of seat

assemblies. Particularly significant in this regard is the potential the invention affords for providing a high quality, low cost, stowable seat assembly. Additional features and advantages of various preferred embodiments will be better understood in view of the detailed description provided below.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a top view of a stowable seat assembly in accordance with a preferred embodiment, showing rows of seats in a normal position.

Fig. 2 is a top view of the stowable seat assembly of Fig. 1 showing a middle row of seats in a first stowable position and a rear row of seats in a second stowable position.

Fig. 3 is a top view of the stowable seat assembly of Fig. 1, showing the back row in the first stowable position.

Fig. 4 is a top view of the stowable seat assembly of Fig. 1, showing the back row of seats in the second stowable position with the seat base down.

Fig. 5 is an exploded perspective view showing the seat back pivoted up against the seat base.

Fig. 6 is an exploded perspective view showing the frame which supports the seats.

Fig. 7 is a side view of a row of seating of the stowable seat assembly of Fig. 1.

Fig. 8 is a front view of the row of seating in Fig. 7, showing a pair of latches.

1 Fig. 9 is a perspective view from underneath the frame of a preferred
2 embodiment of a latch assembly securing the seat to the motor vehicle, shown in an
3 unlatched position.

4 Fig. 10 is a perspective view of the latch assembly of Fig. 9, shown in a
5 latched position.

6
7 It should be understood that the appended drawings are not necessarily to
8 scale, presenting a somewhat simplified representation of various preferred features
9 illustrative of the basic principles of the invention. The specific design features of
10 the stowable seat assembly as disclosed here will be determined in part by the
11 particular intended application and use environment. Certain features of the
12 illustrated embodiments have been enlarged or distorted relative to others to
13 facilitate visualization and clear understanding. In particular, thin features may be
14 thickened, for example, for clarity of illustration. All references to direction and
15 position, unless otherwise indicated, refer to the orientation illustrated in the
16 drawings.

17 18 DETAILED DESCRIPTION OF CERTAIN PREFERRED EMBODIMENTS

19
20 It will be apparent to those skilled in the art, that is, to those who have
21 knowledge or experience in this area of technology, that many uses and design
22 variations are possible for the stowable seat assembly disclosed here. The following
23 detailed discussion of various alternative and preferred features and embodiments

1 will illustrate the general principles of the invention with reference to a stowable seat
2 assembly suitable for use in mass transportation vehicles, most particularly buses
3 and vans. Other embodiments suitable for other applications will be apparent to
4 those skilled in the art given the benefit of this disclosure.

5
6 Fig. 1 shows three rows of a stowable seat assembly 10 shown in a normal
7 position facing forward. Each row comprises a seat 11 having a seat back 12 and a
8 seat base 14. The seat base and seat back may be provided with cushioning to
9 enhance user comfort. The seat base is mounted to a frame 16 which cooperates
10 with a link 20 to connect to a wall 13 of the vehicle. Fig. 2 shows the first row of
11 seats on the far right maintained in the normal position, the second rows of seats
12 moved forward to a first stowed position and a third row of seats on the far left pivots
13 about ninety degrees to a second stowed position. Moving the seat 11 between the
14 normal position and either of the stowed positions involves disengaging the latch
15 assembly (discussed below and shown in greater detail at Figs. 9-10), moving the
16 seat and then reengaging the latch assembly. Preferably the seat base 14 is rigidly
17 connected to the frame. Once the latch assembly is disengaged, the frame 16 and
18 seat 11 are free to pivot with respect to the link and the link can pivot with respect to
19 the wall. Movement of the seat from the normal position to the first stowed position
20 involves pivotal movement of the link 20 about main pivot 18 (counterclockwise as
21 viewed in Figs. 1-4) and pivotal movement of the frame 16 and seat with respect to
22 the link compensating for the movement of the link so as to maintain the seat

generally parallel to the rows of seating in front and behind. This advantageously increases available floor space without blocking views by users of other seats.

Fig. 3 shows how the third row may be moved forward from the normal position to the first stowed position. The seat base 14 is pivoted up so as to allow the seat to be moved forward close to the row of seats in front. In the preferred embodiments shown in the drawings, a row of seats in front must be moved to the first stowed position to allow the row of seats behind to be moved to the second stowed position. As shown in Fig. 4, the second row of seats is in the first stowed position. The third row of seats has the link 20 pivoted forward about the main pivot 18 (again in a direction counterclockwise as shown looking down from the view in Fig. 4) but the seat 11 and frame 16 pivot about frame pivot 19 so that the seat faces inward away from the wall 13.

Figs. 5 and 6 show exploded perspective views of the stowable seat assembly 10, showing the seat base 14 being pivotable with respect to the seat back 12 about a seat pivot 15 between an up position (Fig. 5) and a down position (Fig. 6) where the seat base 14 is generally perpendicular with respect to the seat back 12, in accordance with a highly advantageous feature. Preferably a gas shock 24 is used with the seat base (seen in Figs. 7-8). The gas shock 24 works to resist movement of the seat base 14 from the down position and to resist movement of the seat base from the up position until it overcomes a center point. Thus, the effect of

1 the gas shock is to increase the tendency of the seat base to stay in whatever
2 position it is in currently.

3
4 Figs. 9-10 show a preferred embodiment of a latch assembly. A latch
5 attachment bracket 33 is attached to the underside of the frame 19, and supports a
6 rod 34. The rod is slidable in a bore in the latch attachment bracket 33 in response
7 to rotation of a latch 22 mounted on a bored tube 23. Rotation of the latch 22
8 rotates a cam 25 which urges the rod 34 to slide back and forth. J-hooks 28 extend
9 from the side of the frame 16 and are insertable through an opening 29 to engage
10 mounting bolts 99 positioned on a mounting plate 54 of a wall attachment bracket
11 52. The rod 34 has a cone shaped end 26 which extends into an opening 31 of the
12 wall attachment bracket 52 to engage a stop 27.

13
14 In the locked or latching position shown in Fig. 10, the cone 26 engages the
15 stop 27 in tension and the J-hooks 28 engage the mounting bolts 99 to hold the rows
16 of seats to the vehicle wall. In the unlocked or unlatched position shown in Fig. 9 the
17 latch 22 is pivoted, which in turn rotates the cam 25, allowing the rod to move away
18 from the wall attachment bracket. Once this is accomplished, the seat 11 may be
19 moved away from the wall as discussed above and the J-hooks 28 are permitted
20 to separate from the mounting bolts 99. Preferably a pair of tensioning latches 22
21 may be used, one above the other, as shown in Fig. 8.

1 The wall attachment bracket 52 shown in Figs. 9 and 10 is mounted on the
2 wall 13 and faces the frame 16 so as to engage the J-hooks 28 and cone 26 when
3 the seat is in the normal position. As best shown in Figs. 1-4, another or second
4 wall attachment bracket 52 is mounted on the wall 13 at a position to permit latching
5 of the seat in the first stowed position. However, the frame 16 rotates about 90
6 degrees when the seat is moved from the normal position to the second stowed
7 position. In this instance, the J-hooks 28 and rod 34 no longer face the wall 13. To
8 compensate for this, a third wall attachment bracket 62 is provided, seen in Figs. 1-
9 6. Wall attachment bracket 62 preferably has the same components of the latch
10 assembly as wall attachment bracket 52, but it will be rotated with respect to the wall
11 13 to align with the frame 16 when in the second stowed position, thereby
12 advantageously allowing for latching of the stowable seat assembly to the wall in the
13 second stowed position. Other latch assemblies suitable for use with the stowable
14 seat assembly disclosed herein will be readily apparent to those skilled in the art
15 given the benefit of this disclosure.

16
17 From the foregoing disclosure and detailed description of certain preferred
18 embodiments, it will be apparent that various modifications, additions and other
19 alternative embodiments are possible without departing from the true scope and
20 spirit of the invention. The embodiments discussed were chosen and described to
21 provide the best illustration of the principles of the invention and its practical
22 application to thereby enable one of ordinary skill in the art to use the invention in
23 various embodiments and with various modifications as are suited to the particular

1 use contemplated. All such modifications and variations are within the scope of the
2 invention as determined by the appended claims when interpreted in accordance
3 with the breadth to which they are fairly, legally, and equitably entitled.

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